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ABSTRACT

A study tested a theory of inferencing strategies. Subjects were 40 sixth grade students of average intelligence from a large Western Canadian city who were divided according to reading proficiency and background knowledge. Six passages, three familiar to the students and three unfamiliar to them, were written by the researcher in such a manner that inferences would have to be generated if the students were to comprehend them. Taped half-hour interviews were transcribed and scored for total number of inference strategies, total of each inference strategy, source, elaborations, and location of each inference. Analysis identified 10 inferencing strategies, classified as most productive, productive, and counterproductive. Each strategy performed a distinct function, with different strategies being used by two levels of readers and by both background knowledge groups. Familiarity with the text and reading proficiency significantly influenced the number of extralinguistic elaborations used to support inferences, and the particular strategies used tended to determine whether text or extratextual information was used as a source. Theoretically, these strategies would be a critical factor in an encounter component of a theory of inference, and pedagogically, they differentiate students on the basis of their level of reading proficiency and degree of background knowledge. (JL)

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THE RELATIONSHIP BETWEEN READING PROFICIENCY,

BACKGROUND KNOWLEDGE, AND INFERENCING STRATEGIES

Purpose of the Study

Reading comprehension is frequently defined in terms of a number of cognitive processes which are manifested in the attainment of meaning. This study investigated inferencing, one of the specified processes essential in reading comprehension. While no cohesive theory of inference was available, the first task was to develop such a theory which would provide for an improved understanding in the field of reading and which would provide direction for this research. Within this theoretical framework, a second purpose of the study was to identify the inferencing strategies utilized by grade six students grouped according to reading ability (those very proficient in reading ability and those less proficient in reading ability). The degree to which these readers (subgrouped) were familiar or unfamiliar with the passage content was investigated. In addition, the study elucidated the effect of other possible intervening factors such as the source, the location and the elaboration of the inferences generated, by the two groups of readers.

Background Literature

Five areas highlight facets of the significant role of inference in reading comprehension. For three quarters of the twentieth century researchers (Gray, 1919; Johnson, 1949; Robinson, 1966; Davis, 1968) tried to categorize all the possible reading skills to be included in reading programs. They set up so-called hierarchies of these skills but then realized that it wasn't sufficient to just identify them. So attention

shifted to how these skills are acquired which lead to the next type of research to be carried out on inference. Inference as a comprehension process (Thorndike, 1917; Anderson and Bower, 1973; Kintsch, 1974; Gordon et al. 1978) was seen to be in a sense an extension or continuation of original input. It seems that readers can and do generate inferences in order to reconstruct and retain an author's message. A reader in an inference situation integrates the information in the text with his own background knowledge.

Inference as an integrating agent research (Bransford, Barclay and Franks, 1972; Ortony, 1973; Bower, 1976; Stein and Glenn, 1978) showed that readers tend to combine isolated units into more integrated units in memory, with the resulting integrated ideas being somewhat modified. It seems readers depend upon a broad range of world knowledge which they spontaneously integrate with the text to draw conclusions and to form inferences. The next section will treat inference as a memory aid since original material presented may not endure.

Research into inference as a memory aid (Bartlett, 1932; Rumelhart, Lindsay and Norman, 1972; Anderson and Ortony, 1975; Frederiksen, 1972, 1975; Spiro, 1975) shows that once individual language segments are integrated and fused into events, subjects cannot recover the original pattern which had provided support for the construction. It appears that readers remember text by integrating information in the most semantically acceptable manner. This is influenced by text cues, recall cues including task directions, and by the cognitive framework constructed at the time of information input.

The studies cited thus far have dealt primarily with the nature of inferencing. The final section deals with the developmental aspects.

Inference as a developmental behavior (Piaget, 1957; Inhelder, 1958; Goetz, 1977; Hildyard, 1979; Brown, 1976) seems to have a host of discrepant findings. The important point, however, is that both adults and children can and do generate inferences but that the difference would lie in the nature of the inferencing behavior. Children deal with information in an additive sense while adults are able to hold a number of pieces simultaneously.

A Theory of Inference in Reading Comprehension

The broader phenomenal domain (the area from which the theory takes its content) is defined as the field of Reading and within reading, the focus is on the cognitive and linguistic processes which occur during the act of reading. These processes have been identified and labelled in various ways by different writers in the field (Smith, 1971; Collins et al., 1977; Henry, 1974).

One of these processes, INFERENCING, relates specifically to a cognitive operation which occurs when the READER ENCOUNTERS THE TEXT. Thus to study inference, one must consider additional interacting components within the field of READING.

One must consider factors such as what the reader already knows, his level of reading proficiency, and level of intellectual ability. To have a reader implies that there must be a TEXT, and to have a text implies a WRITER. The reader, writer and text must "come together" in an ENCOUNTER. Further all three must come together within a particular SITUATION, identified to be the READING SITUATION which is part of a broader environment, a component identified as CONTEXT. Overlap in these components is unavoidable since it is believed that all are interdependent and interactive in

nature.

Context is the total environmental setting in which a reader's experiences are embedded. It includes the entire range of external influences both physical and biological, both social and economic factors, both cultural tradition and the reciprocal relations between participants, and their environment. Within any cultural setting, the participants are bound by a series of constitutive and regulative rules (Giboney, 1979).

A large part of the interpretation of visual input (text) is provided by the knowledge of what the message must be, rather than from information contained in the input itself. This extra information comes from the context from which the visual input takes its meaning. Context supplies the rules underlying the construction of our perceptual world, tells one what to expect, and gives plausible interpretations of what is being perceived. The reader is heavily dependent on his experiential background to decode what he is reading. If the people, places, events, and objects encountered by the reader are unfamiliar, unrelated to previous experiences, then he will have difficulty reading about them even though the language elements may be familiar.

The situation in which a reader finds himself in terms of the temporal and spatial location and task demands is identified as the reading situation. The nature of the reading situation may vary depending upon the purpose(s) which may be established by the reader or for the reader. The reader may come to a reading situation with two general types of purpose. He may intend to understand the writer's intended message or he may have some other intention such that he does not intend to understand the writer's intended message. The extent to which the reader is successful will be influenced by the degree to which the reader is familiar with the context in which the

reading situation takes place, by his knowledge of the writer, and his familiarity with the language used.

The purpose for which a reader reads has a great deal of influence on comprehension according to Smith (1967), Burns and Roe (1976). A reader's purpose is achieved when he has been successful in finding a particular piece of information or solved a problem he has fulfilled the purpose which he set in his reading. The reader's performance may vary for particular reading tasks depending upon the nature of the task and upon the reader's familiarity or unfamiliarity with the writer and the text.

Without a writer there cannot be a reading situation. When a writer is planning an utterance, he has many options which can be classified into three categories: propositional content, illocutionary content, and thematic structure (including syntactic choices). The writer (author) must consider the appropriate linguistic device to relay his intentions to the reader; also the writer must consider how states or events are to be initiated; and how much the reader already knows about what is being written.

The basic ideas (units) that writers want to express, the core of the sentences to be constructed, are its propositions. .The writer has to decide on the sequencing of the content (Clements, 1976) and on the specific syntactic structures needed to express relationships (Fagan, 1978). In addition, he has to decide what is to be subject and predicate (thematic structure) which specify what is being talked about and what is being said about it. Given and new information specify what the reader already knows and what he is expected to be able to identify uniquely from what he doesn't yet know.

The details of language structure and the nature of the processes involved in its use are greatly affected by the need to transmit meaning

through a sequential medium. The language in the text is also dependent upon the situation as to whether it will be expressive or rhetorical. If the writer is to convey his message successfully, then he is bound by certain principles of communication. These conventions for successful communication are termed by Grice (1967) the "Cooperative Principle".

Armed with the various resources discussed above the writer designs an utterance anticipating how the reader will interpret it and the reader interprets it in light of the hypotheses about the writer's intent. This reflexiveness (mutuality) is one of the most significant features of natural language and must be taken into account explicitly in order to cope with any notion of meaning.

In the case of a reading situation, the text is the print used to convey a message. It includes the orthographical features of words, the actual lexical items, and their arrangement into units of meaning. Researchers have described texts in various ways. Kintsch and Van Dijk (1978) propose that the meaning of a text may be represented by means of a structured list of propositions.

A second view of text is based on Searle's (1969) work. He believes that the propositional content of an utterance contains the units of meaning that reflect the ideas that the writer wants to express, which he terms the propositional act. This is similar to Kintsch's (1974) notion of propositions which are composed of concepts while Searle's propositional act conveys the conceptual content of an utterance.

A third view of text derives from the Semantic Potential Theory of Language developed by Fagan (1978) which specifies three categories of information that may be communicated in language. Like Kintsch, Fagan

maintains that the basic unit of text is the proposition; he differs from Kintsch in its formulation. Whereas Kintsch maintains that the proposition is entirely semantic and is identified on semantic grounds, Fagan believes that the proposition, though semantic in content, may be specified syntactically.

A further view of text is represented by some researchers (Bower, 1976; Mandler and Johnson, 1977; Stein, 1978) who have attempted to represent text cohesion in terms of story grammars which formalize story structure. From the four views of language presented it appears that in the development of a text one may represent the units of meaning in various ways, the writer's choice being dependent upon his purpose.

The reader has a reality which is the life he is living. A reader's expectations about a linguistic event are derived from three sources: (1) his knowledge of the world, (2) his knowledge of language and various linguistic rules, and (3) his knowledge of what has just been perceived. The reader imposes organization on the world around him.

Everyone has a mental framework based on cultural experience into which new facts are fitted. This cognitive structure or one's schemata (Bartlett, 1932) imposes a structure on the information one receives which guides later reconstruction of experiences.

Whether knowledge is general or cultural specific, not all of it may be relevant to a particular reading task. Kjolseth (1972) depicts degrees of relevance of the knowledge possessed by a reader which he describes to be in terms of four bases of knowledge: background, foreground, emergent ground, and transcendent ground. Whereas all readers will share some knowledge, there is cultural specific knowledge which will differentiate cul-

tural groups. Thus the knowledge required for a particular reading task will vary for readers from different sub-cultural groups. The reader's prior knowledge has a forceful impact on both the kind of information that is synthesized and on the degree of synthesis.

Factors other than prior knowledge will also influence the manner in which a reader encounters text. One such factor common in an academic setting is the subject's level of proficiency as a reader. If this is the case, then it would be expected that readers of different levels of proficiency would utilize different strategies in comprehending texts. Studies have found (Weiner and Cromer, 1967; Schienbien, 1978; McLeod, 1978; Inglis, 1974; Goodman, 1973) that proficient readers are both effective and efficient in utilizing the textual information and their own experiences whether it be in cue selection, cue elaboration, inference instantiation with the text, or in making accurate predictions.

Encounter in general is defined as the interaction between the various components of the model. In a reading situation, the reader is part of a broader environmental context and encounters the text and its writer. The reader's encounter with the text is based on information from prior knowledge, the text, and various mental processes.

Processes have been defined in different ways by several researchers (Das et al, 1975). Factors such as the socio-cultural, genetic, and task demands influence one's mode of processing information. As the reader interacts with the text, he engages in a number of "processes" which mediate between the text, the reader's prior knowledge, and the output, which in this study are the resultant inferences.

Given a text, the reader must first understand the problem identified for him or by him (purpose for reading). Understanding the goal, the con-

ditions imposed (reading situations), and the data (textual information), the reader must plan a solution. It seems then that a reader has available two approaches which may be used to describe a text encounter. The text-based (bottom-up) approach is similar to successive processing where the reader gradually attains an inductive understanding of the overall structure and meaning of the text. In a schema-based (top-down) approach where the reader may adopt simultaneous processing, the reader uses the text as the stimulus to activate his prior knowledge to intuitively set up expectations about the text into which new information is assimilated and to impose a structure on a text. Within any reading situation, however, the reader may use either or both of these approaches depending upon the demands of the situation.

Comprehension in reading involves using a set of procedures that allows the reader to select from his personal experience and knowledge about the world, those concepts or ideas that are relevant to the immediate text and consistent with his purposes. Therefore, as a reader works through a text, he often elaborates on what is implied by the author and arrives at intended inferences. Inferences perform at least two basic functions. In the first place, they allow the reader to extend and enrich the explicit meanings intended by the author. Second, inferences connect the explicit events with the events which are not explicitly treated by the author, but rather left as understood or implicit. Yet if such inferences were ignored by the reader, their absence could detract from the richness of meaning inherent in the text. Thus, the reader must construct the meaning intended, on the basis of the textual information given, as governed by the reader's prior knowledge, and by that form of knowledge which is relevant at different levels of involvement.

The importance of inference in understanding even the most simple text was pointed out by Thorndike in 1917. Inference makes it possible for the reader to go beyond the information which the author communicated (Goetz, 1977) and is an integral part of the comprehension of and memory for text (Bransford and McCarrell, 1974; Schank, 1975; Brewer, 1977; Harris and Monaco, 1978). Inferencing is dependent upon relating the text information to prior knowledge (Bransford and Johnson, 1973). Prior knowledge is crucial since one cannot understand an utterance (text) unless one knows what is being talked about, and in order to grasp what the speaker intended, one must relate utterances to prior knowledge and to one another (Bartlett, 1932; Rommetveit, 1971; and Giboney, 1979).

Perhaps some of the most recent and extensive work in delineating the process of inferencing has been conducted by Collins et al. (1977). A significant contribution of the research by Collins et al. was the identification of five strategies as means used by adult readers to arrive at inferences in text understanding. Further the study elucidated the effect of other possible intervening factors such as the source, the location and the elaboration of the inferences generated, by the two groups of readers.

Design of the Study

Experimental population and sample.

The sample for this study was drawn from 1,000 grade six students from a large western Canadian city. Students who met the inclusion criteria were separated into boys and girls from which forty students (twenty boys and twenty girls) were randomly selected. The inclusion criterion adhered to in the sample selection entailed the following. In an attempt to control for subjects at the extreme ends of the scale on intellectual ability, all

forty students were of average intelligence. The Less Proficient reader was defined as a subject who attained a vocabulary and comprehension below the fiftieth percentile and the Very Proficient reader was defined as a subject who attained a vocabulary and comprehension score above the eighty-fifth percentile at the end of grade five. The text used was The Canadian Test of Basic Skills, 1977. Only those students for whom English was a first language were considered for the study. Since a basic assumption of the study was that the subjects would be familiar with certain aspects of Alberta culture and unfamiliar with certain aspects of Newfoundland culture, then only those students who had started school in the Edmonton system were selected. Only those students who volunteered to participate in the study after they were informed about its purpose were considered. The exclusion criteria entailed students involved in language immersion programs, grade repeaters and factors such as acute visual, speech, hearing and emotional disorders as the researcher felt that these factors could have influenced the inferencing strategies employed which may not be reflective of the strategies one would expect from students without these experiences and/or these types of impairments.

Instrumentation

Six passages (three passages familiar to the students and three passages unfamiliar to the students) were written by the researcher and were written in such a manner that inferences would have to be generated if the students were to comprehend the passages. In order to ensure that the passages designated as familiar and unfamiliar were as parallel as possible, specific criteria were established and used as guidelines in their con-

struction. Inference and probe questions were developed and were unbiased toward any particular strategy but were designed to stimulate further interpretation if the students did not freely provide the information during the introspection. Sample copies of the inference passage and inference probe questions are available in Appendix A.

Data Collection

Each passage was written so that there were five goal structures (A, B, C, D, E) and a resolution (F) and the subjects were asked to introspect as to what they were thinking and why after they had read each episode. His procedure was justified on the basis of previous research (Olshavsky, 1975; Baker and Stein, 1981; and Frase, 1968). The interview sessions were held on an individual basis, the entire session (approximately one-half hour in length) with each student was taped and later transcribed.

Analysis of the Collected Data

The first task was to identify and number the inferences made by each student. The second task involved the inspection of the students' protocols and the identification of the point (Early or Late) at which the students made the main inference (had accurately identified the topic). The protocols were then divided into idea units which served as the information measure which was equated with a particular inference strategy. Each student's protocol was studied per passage to first acquire a "feeling" for how the student's thinking progressed throughout the passage. The investigator then assigned an inference strategy to each idea unit. Upon completion of the assignment of the strategies to the idea units, the number of times each strategy was used across all three passages read by each student

was tallied. Key concepts (nouns, verbs, adjectives and adverbs) were identified as a means to measure the amount of elaboration the students had given followed then by the identification of whether the source of that elaboration was made up of information from both the text (linguistic) and background knowledge (extralinguistic) sources, a raw count of the number of times each key concept came from either source was tallied.

Inter-rater reliabilities were performed to check the reliability of the analyses. The percentages of B agreement ranged from 93.4 percent to 100 percent by the other judge.

Subjects' protocols were scored for each of the five analyses categories: total number of inference strategies, total of each inference strategy, source, elaborations, and location of each inference. Each of these scores was used as a criterion variable in a 2-way analysis of variance design with level of reading proficiency (very proficient and less proficient) and background knowledge (unfamiliar or familiar) as the independent variables. Due to the nature of this study, the case base was minimized to forty and the level of statistical significance adopted was at the .10 level. Since T-tests and F-ratios are very sensitive to sample-size, in all likelihood if the case base were increased then the findings would be statistically significant at the .05 level simply because of the increase in sample size. It was also felt that since this study was testing a newly constructed theory, the level of significance could be more lenient to help detect differences and suggest trends.

Findings

Ten Inferencing Strategies

Ten inferencing strategies* were identified as being used by the

grade six students. Each strategy will be discussed singly with examples from subjects' responses. The actual strategy is in parenthesis ().

Strategy 1 - Rebinding. When a reader suggests or hypothesizes a possible interpretation and then immediately realizes that this interpretation conflicts with previous information he then substitutes another interpretation. In essence the reader is "rebinding" the present information to a previous interpretation.

Examples:

Farming Passage

They're using the auger to put it into the graineries (not the graineries but their bins).

Rodeo Passage

In response to question C_2. "Why would Marty need glasses?" the student says

Marty had glasses and he forgot them at home (no he lost them).

Strategy 2 - Questioning a Default Interpretation and/or a Direct or Indirect Conflict. When the reader makes an initial interpretation of the input, this may trigger off a knowledge schema which the reader may or may not continue to maintain. However, the reader may have misinterpreted certain data and/or made incorrect assumptions based on the data available. When subsequent information is in conflict, rather than questioning the current information or choice (rebinding), the reader questions a previous interpretation and/or accompanying assumptions.

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* The five inferencing strategies defined by Collins et al. (1977) were modified and included in the ten identified.

Examples:

Skiing Passage

(I was wrong about they're going for a hike), they're going skiing because it says he waited in line for the chairlift. (Now I think it's not his first time), he's a pretty good skier.

Fishing Passage

They're fishermen (not sailors or lumberjacks) because it says here that the net was hard to pull.

Strategy 3 - Shifting of Focus. When the immediate question cannot be readily resolved, then the reader may address surrounding but related though not the key questions. Frequently a response to such a question will constrain the response to the target question and a correct interpretation will be more readily available.

Examples:

Randying Passage

The kids are all on this hill playing, and they're making trains but ("What's a coaster?").

Skiing Passage

After reading Episode B, the student asks ("What's a chalet?") and ("Why would he be scared?")

Strategy 4 - Analysing Alternatives. The reader does not close in on any one interpretation of the data. Rather more than one possibility or alternative is raised and tentatively held until more information is available. Tentative words such as, "probably", "maybe", "or", "might", "I think", are often used with this strategy.

Examples:

Garden Party Passage

They're going (to church or on a trip) to visit their aunt because they're putting on their best clothes.

Fishing Passage

(They might sell the fish) (or they could unload) them and put them in a freezer and go out again.

Strategy 5 - Assigning an Alternate Case. When information cannot be interpreted to fit within existing data, and when subsequent information does not provide a solution, then an alternate interpretation is held in abeyance from other information as a separate thread or strand. It seems as if the reader is dichotomizing his initial schema.

Examples:

Rodeo Passage

The student having already talked about going on a picnic or to a party wonders about the glasses. The student then says "He was going to a masquerade party and he wanted to wear glasses (maybe they were the glasses with the big nose and moustache).

Randying Passage

The student having just read about the new coaster responds to the question C_1. Why did he have to try out his new coaster? (It's the day after Christmas and there's just a few days left before school starts up again so he wants to try out his new coaster while he has the chance.)

Strategy 6 - Confirming an Immediate Prior Interpretation. The reader interprets a subsequent response so that it is consistent with the response

immediately preceding.

Examples:

Skiing Passage

They were skiing (because of the word slope), (I thought about winter and skiing).

Fishing Passage

They're going fishing (because of the word bay).

Strategy 7 - Confirming a Non-Immediate Prior Interpretation. Having made a particular interpretation, the reader then considers alternate interpretations but on the basis of subsequent information reverts to the earlier interpretation, confirming this interpretation as his choice.

Examples:

Skiing Passage

The student previously thought that Marty was going skiing for the first time, then after exposure to another episode of the passage, she states ("Now I know he's going skiing probably for the first time.")

Garden Party Passage

The student having already thought that snaps were pictures confirms after exposure to the word camera ("Now I'm sure snaps are pictures.")

Strategy 8 - Assuming a Default Interpretation and Transforming Information. The reader makes a particular assumption based on incorrect knowledge. That is, the reader may lack prior knowledge associations for the data presented or he misconstrues new data presented in an attempt to confirm a previous interpretation in spite of inconsistencies.

Examples:

Fishing Passage

(They're going to the bay to go shopping.) In response to Question D_1, "Why did they tie up to the wharf?" the student says ("So they wouldn't lose their fish.")

Randying Passage

Maybe after the fastest run he'll go home. The text then says nothing about his going home, however, after the student reads it she says ("He walked home and was glad he was safe.")

Strategy 9 - Neglecting to Respond or Holding Information. The reader has no interpretation of the information available, which is signified by silence, the expressions, "I don't know", "no", or the reader makes an interpretation and rephrases this same interpretation in two or more variations without the addition of any new information.

Examples:

Farming Passage

In response to Question D_1. "Why did he tie the tarp over the grain box?" the student responds ("I don't know.")

Oftentimes questions were asked and no response was given. This strategy was utilized on all six passages. Other students chose to reiterate a previous interpretation such as on the Rodeo Passage.

Rodeo Passage

He's getting up in the morning and like he's looking for his favorite jeans, (well he's looking for his jeans) and then his dad shouted he was about to leave, (like if you want to come, come now) (because I'm leaving), (so if you want to come, come now).

Strategy 10 - Empathizing from Experience. The reader on the basis of the data and his own personal experiences projects himself into the actual situation and experiences another's condition or state which becomes a part of his interpretation.

Examples:

Rodeo Passage

They are at a rodeo and (I don't want the cows to get hurt because I don't like calf roping).

Skiing Passage

He's scared because it's his first time skiing, (I was sure scared the first time I went).

In response to Question E_2. "Do you think that he felt good that he didn't crash into the lineup? Why?" the student responded 'Yeah, I don't know because like ah, (if he did, like "Oh God, Help Me." like this is all my new stuff and I don't want to bend any of it or something and like he could have hurt somebody else and it wouldn't make a good run down the hill, like because he would have gone down the hill perfectly and then he comes crashing into the people in the lineup and then like they'd say "Hey, get out of there, what are you doing?" and he'd just feel stupid)."

Ten mutually exclusive (according to factor analysis) inferencing strategies were identified as being employed by the participants in the present study. Because of this finding, the researcher is not prepared at this point to discard any of these factors. Instead it is suggested that these strategies might be classified according to three types labelled as "Most Productive", "Productive", and "Counterproductive".

Most Productive Strategies. Those strategies identified as most productive are strategies three, four, six, and ten. Strategy three, "Shifting of Focus," lends flexibility to the reader such that when an immediate question cannot be answered, the reader approaches the problem from another perspective. A reader who uses strategy four, "Analyzing Alternatives", holds information tentatively in the presence of uncertainty until further information is acquired. Strategy six, "Confirming an Immediate Prior Interpretation" allows the reader to verify and consequently strengthen a previous interpretation of the text with his activated schema. This compatibility of information between the reader and the text and between parts of the text further encourages the reader to become more participative, thus possibly allowing the reader to project himself into the reading situation ultimately resulting in the use of strategy ten, "Empathizing from Experience". All four of these effective strategies are used by the very proficient reader who seems to make greater use of them in a background plus situation.

Those strategies identified as most productive proved to be highly associated with and instrumental in influencing whether the main inference was made early or late; and whether elaborations which were provided by the readers were extratextually based.

Productive Strategies. Those strategies (one, two, seven) designated as productive all serve a specific function for the reader. Strategy one serves to allow the reader to change his mind and to formulate another interpretation while strategy two permits the reader to question a previous interpretation when subsequent information suggests a conflict. On the basis of subsequent information, a reader may have to revert to an earlier

interpretation which is the function served by strategy seven "Confirming a Non-Immediate Prior Interpretation". Even though these strategies did not differentiate groups as did the other two sets of strategies, their importance should not be undermined, for frequently a reader may have to use any or all of these strategies before he can identify the appropriate schema, at which point only then is the reader able to capitalize upon those strategies identified as more effective.

Counterproductive Strategies. Those strategies identified as counterproductive are most often used by the less proficient reader and are generally more often used when the topic is unfamiliar to the reader. Strategy five "Assigning an Alternate Case," was used when the reader was unable to fit new information within the existing data. It seemed that the reader dichotomized his schema thereby suggesting that he was working through the text in a piecemeal manner rather than working from an overall schema. Inappropriate associations to the textual information oftentimes caused the reader to stray further from the text and eventually causing them to alter the information in order to confirm their previous thoughts (strategy eight). To further render the less proficient reader unproductive was the continued use of strategy nine where the reader would either just repeat an earlier interpretation or choose to say nothing.

Other Findings

In this study, both groups of readers used comparable total numbers of inferencing strategies on the two types of passages. Pupils reading the background knowledge plus (familiar) passages and those students classified as very proficient provided more extralinguistic elaborations, with the background plus passages being the most influential factor. The in-

fluence of reader proficiency on the location (whether the main inference was made early or late) was statistically significant so the null hypothesis was rejected, however, the influence of background knowledge was not statistically significant so that portion of the null hypothesis was not rejected. Neither the very proficient pupils nor less proficient pupils grouped according to the background knowledge plus passages or minus passages differed on the proportion of the information source that was extralinguistic in nature.

Conclusions and discussion

Neither background knowledge, reading proficiency or the interaction effects of the two were found to have any significant impression on the total number of inferencing strategies used. The immediate question to be asked when totals of different groups are similar is whether the parts are the same and, in this case, whether the same inferencing strategies were used by each group? Each of the ten inferencing strategies identified perform a distinct function and that different strategies are used by the two levels of readers and by both the background knowledge groups.

The degree of background knowledge and the level of reading proficiency were significant factors in the use of particular inferencing strategies.

Familiarity with text and proficiency in reading significantly influenced the number of extralinguistic elaborations used to support the inferences produced by the pupils, corroborated by the findings of Schank, 1975 and Reder, 1978.

Neither background knowledge nor level of reading proficiency signif-

icantly affected the degree to which text information versus extratextual data was used as a source to produce inferences. Rather, particular inferencing strategies used by the readers tended to determine which source was used. Strategies six and ten contributed to an expanded and enhanced understanding of the passages thus promoting more use of extratextual information. Thus, in order to confirm prior interpretations and to empathize with the story situation, it seemed that the reader is operating within a schema that necessitated data beyond what was supplied by the text. Strategy nine, by its very nature (Not Responding or Repeating Information), reflected the restricted use of beyond the text information because the students did not supply an interpretation which would go beyond the text.

Background knowledge, level of reading proficiency and nature of the inferencing strategies significantly affected the point at which readers made the main inference (Early or Late), with reading proficiency being the most powerful influence. It seems that the proficient reader selects information from the text which he can immediately anchor to what he already knows thus setting up expectations about the text which he can maintain, ultimately furthering his understanding of the text. The less proficient reader seemed to rely upon strategy nine which had a negative effect on the interpreting of incoming data within an existing schema. It seems that the weak reader, even though he may possess the appropriate schema, cannot readily access text data, possibly due to an overreliance on text, a lack of confidence, or because he has habitually employed ineffective strategies.

Implications

Theoretical Modifications

Context, Reading Situation, Writer and Text were not directly tested in this research so it may still be assumed that a Theory of Inference would include these components until at such time, data would determine otherwise. The two components, Reader and Reader-text Encounter were tested. Both familiarity or unfamiliarity with text and level of reading proficiency were found to be significant in determining the kind of inferencing strategies used. Thus the data would indicate that these two factors within the Reader component should be retained in any model of inference.

The ten inferencing strategies as identified were employed by the participants in this research and would therefore be a critical factor for consideration in the Encounter component for a Theory of Inference. Furthermore, data from the analyses of covariance indicated that the strategy employed is more important than either of the between-reader factors (reading proficiency and background knowledge). Thus, in a Theory of Inference, the Encounter as defined by strategy seems to be the focal point.

Pedagogical Implications

Rather than suggesting plans for developing reading programs, the study should be seen as having identified inferencing strategies which differentiate students on the basis of their level of reading proficiency and degree of background knowledge. The researcher has suggested three category divisions for those strategies: most productive, productive, and counterproductive. It would seem that the teacher should develop within his/her students competency in the use of the most productive strategies

while helping them minimize their reliance on the use of those strategies that are counterproductive.

In reading instructional materials, readers are generally "taught" how to make inferences by merely answering inference type questions. In light of the findings of this research, this procedure does not seem adequate for enabling students to develop adequate inferencing strategies. Authors of instructional materials need to provide more specific suggestions for teaching "inferencing".

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Appendix A.

SKIING (familiar)

A. The slope was covered with people. But there was room for lots more.

B. Marty's heart pounded with excitement as he raced past the chalet to join them. He was scared a little.

C. He had all new gear. He was anxious as he waited in line for the chairlift. He checked his boots and bindings.

D. The run was steep and had powder snow at the top. Marty dodged and weaved every mogul without a wipeout.

E. The steel edges saved him from crashing into the lineup.

F. Yes, skiing is a good way to spend a winter's day.

SKIING

A. 1. Why were the people on the slope?
*2. What were they doing? Why do you think that?
3. What questions come to mind?
So what do you think they were doing?

B. 1. Why did Marty's heart pound with excitement?
2. What questions come to mind?
So what do you think . . .
P. What do you think is going to happen next?

C. 1. Why was Marty waiting in line?
2. Why did he check his boots and bindings?
3. What questions come to mind?
So what do you think . . .
P. What do you think is going to happen next?

D. 1. Why was it important that Marty not have a wipeout? Why?
2. Why would you dodge and weave a mogul? How?
3. What questions come to mind?
So what do you think . . .
Predict.

E. 1. If A(2) is not answered -- What were they doing? Why?
2. Do you think that he felt good that he did not crash into the lineup? Why?
3. Why do you think the steel edges were important? How?

F. So were you correct about what they were doing?

Depending on the responses to the above questions:

1. Why did you change your mind?
2. Why did you raise that question?
3. Why do you think that (indicating specifically) might happen? Was possible?
4. What do you mean by chalet? chairlift? mogul? wipeout?

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* Main inference.